Weekly report

1 Done

1.1 Attend our graduation ceremony.

1.2 Take graduation photos with my friends in each campus.

1.3 Have several talks with Xia Jing and invite Cai Xi-Wen to help us design user study:

We intent to evaluate three designs (map deformation for privacy protection) from the following aspects:

1) Effectiveness: for each design, there are three or more trajectories are given, participants need to find as many as possible useful trajectory segments and explain the meaning. The amount, time and the correct rate will be regarded as reference conditions of evaluation.
2) The ability of privacy protection: in the cases, locations with different POIs will be marked, participants need to locate them on the real map. The error will be regarded as reference condition of evaluation. Note that time here is not a conditions in that no matter how long it takes, the loss of privacy must not happen.
3) Universal or not.
4) Generation time.

1.4 Read papers:

Early Detection of Topical Expertise in Community Question Answering
(From SIGIR 2015)

This paper introduces an approach to detect potential topical experts in community question answering platforms.

Three types of features are extracted:

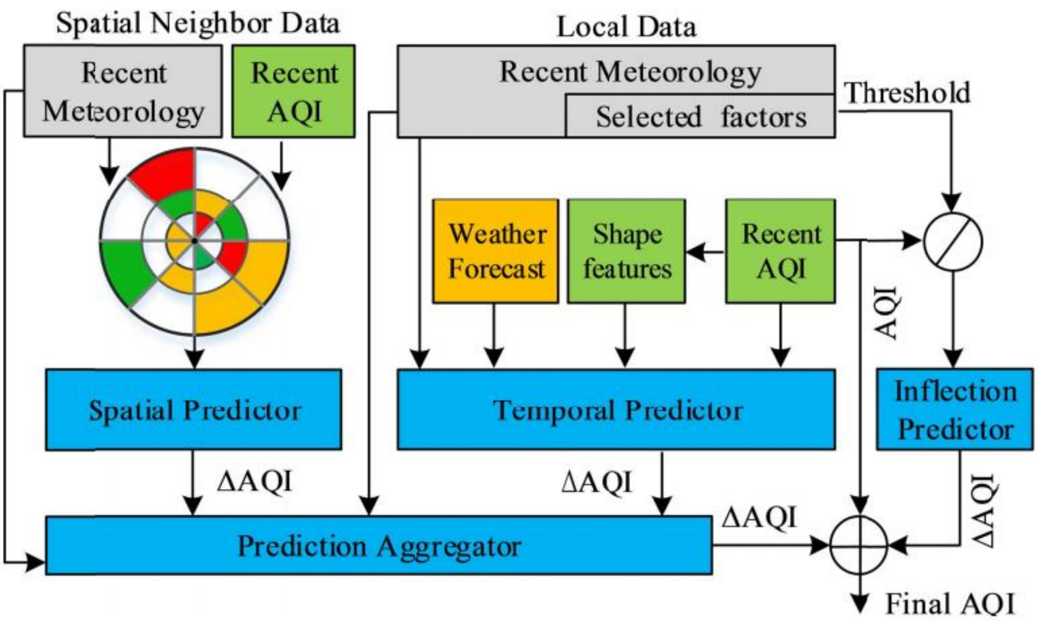
1) Textual: Firstly, for each topic, a profile is generated. Then, they aggregate a user's textual relevance scores of this topic.
2) Behavioral: For instance, an expert is likely to ask fewer questions on his field of expertise and could be selective in what questions to answer or comment on.
3) Time-aware: They measure the time interval as the number of days between the moments a user joined the forum and when the posted his N-th best answer.

Besides, they perform an ablation study to find which the most important feature is within and across feature sets.

Forecasting Fine-Grained Air Quality Based on Big Data
(From KDD 2015)

In this paper, a multi-view-based hybrid model that predict future air quality with

inaccurate and insufficient data is proposed. Furthermore a related system has been deployed. The predictive model consisting of four components: a (local) temporal predictor, a (global) spatial predictor, an inflection predictor and a prediction aggregator. Sometimes, the features used by the spatial and temporal predictors do not have any overlap, however, both of them are significant. Different models are trained for each hour in the next six hours and two models for each time interval are used to predict its maximum and minimum values. All these models need to be retrained every a few months.



Automatic Generation of Destination Maps

(From TOG 2010)

A database stores the complete network of roads, in which edges (including the name of the road, maximum speed and one of six functional classes) represent straight road segments and nodes represent either bends within a road or road intersections.

System overview: The input includes a destination and an area of interest. Then, four step is implemented:

1) Road selection chooses the roads to include in the map.
2) Rode simplification merges the divided highways and complex highway interchanges. It also straightens the geometric shape of the roads.

3) Road layout computes the length, position and orientation of the roads such that all roads are visible.
4) Decoration adds labels and geographic context such as bodies of water to the map.

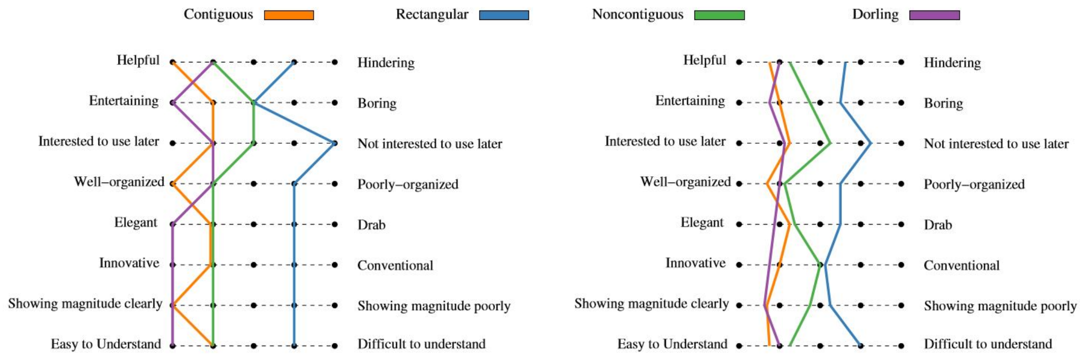
The State of the Art in Cartograms

(From EuroVis 2016)

There are three major design dimensions along which cartograms may vary:

1) Statistical accuracy: How well the modified areas represent the corresponding statistic shown. The cartographic error, measuring the relative distortion of the area of each modified region from the desired statistic, need to be minimized.
2) Geographical accuracy: How much the modified shapes and locations of the regions resemble those in the original map.
3) Topological accuracy: How well the topology of the cartogram matches the topology of the original map.

Besides, the contiguity is also listed to evaluate.



Furthermore, several task taxonomies are summarized as detecting change, locating, recognizing, identifying, comparing, finding top-k, finding adjacency, clustering, summarizing and filtering.

Location-dependent generalization of road networks based on equivalent destinations

(From EuroVis 2016)

This paper provide four definitions as shown in the figure below:

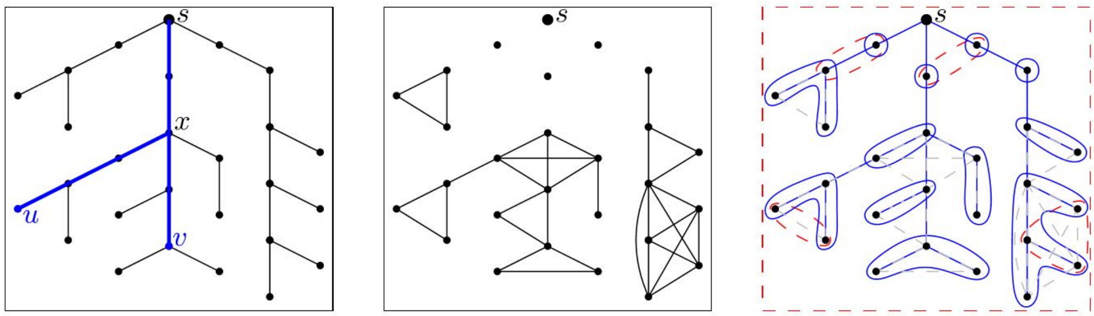
1) Directed Similarity:

$$\sigma(u,v) = w(P_{sx})/w(P_{su})$$

2) α-Compatible (⊕):

$$\sigma(u,v) \geq \alpha \quad \text{and} \quad \sigma(v,u) \geq \alpha$$

3) Compatibility graph: G⊕= (V,E⊕) has an edge between any two vertices u, v ∈ V if and only if u⊕v.
4) Allowed contraction: Contracting a set of vertices S ⊆ V is called allowed if and only if S is connected and all vertices in S are pairwise α-Compatible.



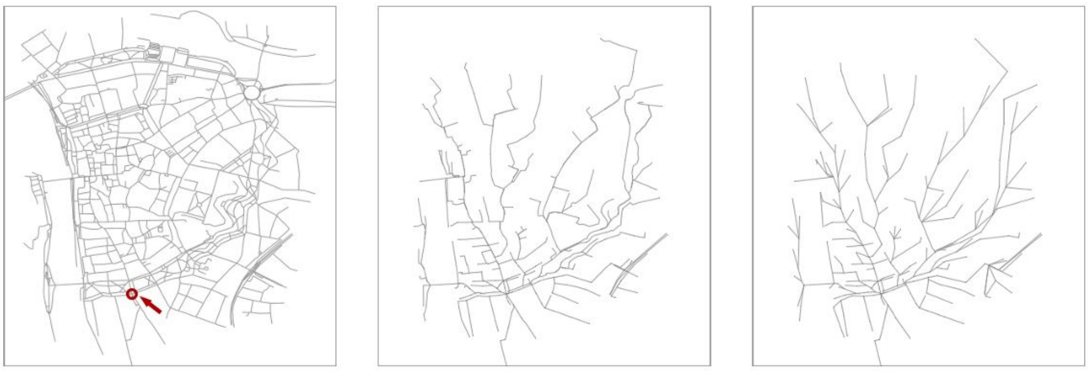
(a) $\sigma(u,v) = \frac{2}{5}$ and $\sigma(v,u) = \frac{1}{2}$; hence u and v are α-compatible only for $\alpha \leq \frac{2}{5}$.

(b) Compatibility graph $G_{\oplus}$ for $\alpha = \frac{2}{3}$.

(c) Selection of allowed contractions (blue, computed with Algorithm 1) and counterexamples (red) due to a lack of connectivity in $\mathcal{T}$ or $G_{\oplus}$.

The authors provide three visualizations:

1) Direct drawing: draw a straight line segment between two root points.
2) Detailed drawing: draw the path that connects two root points.
3) Simplified drawing: construct the detailed drawing and apply a topologically-safe simplification algorithm (greedily delete vertices but never move them and never delete cell roots).



(a) Input. (b) Detailed. (c) Simplified.

Figure 5: *Würzburg with $\alpha = 0.8$, with the vertex s indicated in figure (a). The simplified drawing contains only two internal branches: Figure 3 is a crop of this map showing the extra vertices (located near the bottom right of this figure).*

Finally, with various values of α, the result from detailed drawing and direct drawing are listed below:

(a) Detailed, $\alpha = 0.3$.

(b) Detailed, $\alpha = 0.5$.

(c) Detailed, $\alpha = 0.7$.

(d) Detailed, $\alpha = 0.9$.

(e) Direct, $\alpha = 0.5$.

(f) Direct, $\alpha = 0.7$.